IS 7016-6 (1984): Methods of Test for Coated and Treated Fabrics, Part 6: Determination of Bursting Strength [PCD 13: Rubber and Rubber Products]

BLANK PAGE

IS : 7016 (Part 6) - 1984
(Reaffirmed 2003)

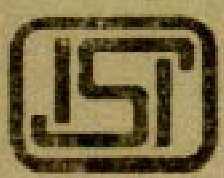
Indian Standard

METHODS OF TEST FOR COATED AND TREATED FABRICS

PART 6 DETERMINATION OF BURSTING STRENGTH

(First Revision)

UDC 677·077·65 : 677·017·464



INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3

July 1984

Indian Standard

METHODS OF TEST FOR COATED AND TREATED FABRICS

PART 6 DETERMINATION OF BURSTING STRENGTH

(First Revision)

Treated Fabrics Sectional Committee, PCDC 16

Chairman	*Representing*
SHRI S. L. GANDHI	Ministry of Defence (R&D)
Members	
COL R. G. WASTRAD (*Alternate* to Shri S. L. Gandhi)	
SHRI R. L. ARORA	Directorate General of Mines Safety, Dhanbad
SHRI S. C. BATRA (*Alternate*)	
SHRI A. K. BANDOPADHYA	Ministry of Defence (DGI)
SHRI P. L. NAG (*Alternate*)	
SHRI A. T. BASAK	Directorate General of Supplies & Disposals, New Delhi
SHRI A. R. HALDER (*Alternate*)	
SHRI BASANT KUMAR	Basant Pran Electric Co Pvt Ltd, Calcutta
SHRI J. S. NARULA (*Alternate*)	
SHRI D. J. BHARUCHA	Bayer (India) Ltd, Bombay
SHRI P. K. CHATTERJEE (*Alternate*)	
SHRI T. S. BIDDAPA	National Organic Chemical Industries Ltd, Bombay
SHRI J. K. VADODARIA (*Alternate*)	
DR S. N. CHAKRAVORTY	Modi Rubber Ltd, Modipuram
SHRI S. K. MUSTAFI (*Alternate*)	
SHRI B. DUTTA	Bengal Waterproof Ltd, Calcutta
SHRI R. N. WAHIE (*Alternate*)	
SHRI A. GHOSH	National Test House, Calcutta
SHRI N. N. GOYAL	Fibreglass Pilkington Ltd, Bombay
SHRI G. K. TAKIA (*Alternate*)	
JOINT DIRECTOR (RESEARCH)	Research, Designs and Standards Organization, Lucknow
DEPUTY DIRECTOR (MET) (*Alternate*)	

(*Continued on page* 2)

(*Continued from page* 1)

Members	*Representing*
SHRI Z. S. KAJIJI	Caprihans India Ltd, Thane
SHRI J. R. MODI	Ahmedabad Textile Industries Research Association, Ahmadabad
SHRI RAMAN M. PATEL	The Bhor Industries Ltd, Bombay
SHRI K. L. SHAH (*Alternate*)	
SHRI B. ROY	East India Rubber Works Pvt Ltd, Calcutta
SHRI P. P. SHARMA	Directorate General of Technical Development, New Delhi
SHRI N. K. AGARWAL (*Alternate*)	
SHRI R. C. TRIVEDI	Verma Industrial Ltd, Bangalore
SHRI R. KRISHNA PILLAI (*Alternate*)	
SHRI P. R. VISHWAMBHARAN	Central Warehousing Corporation, New Delhi
SHRI K. GOPINATHA MENON (*Alternate*)	
SHRI M. S. SAXENA, Director (P&C)	Director General, ISI (*Ex-officio Member*)

Secretary

DR VINOD K. JAIN
Assistant Director (P&C), ISI

Methods of Test for Treated Fabrics Subcommittee, PCDC 16 : 6

Convener

SHRI S. L. GANDHI	Ministry of Defence (R&D)

Members

SHRI M. L. BAHRANI (*Alternate* to Shri S. L. Gandhi)	
DR B. R. C. ANAND	ILAC Limited, Calico Group, Bombay
SHRI S. MITRA (*Alternate*)	
SHRI A. T. BASAK	Directorate General of Supplies and Disposals, New Delhi
SHRI P. K. BASU (*Alternate*)	
SHRI A. CHELLARAJ	Madura Coats Ltd, Madurai
SHRI S. GNANASEKHARAN (*Alternate*)	
SHRI A. GHOSH	National Test House, Calcutta
DR S. P. MANIK	Ministry of Railways
SHRI R. N. MEHROTRA	Synthetics and Chemicals Ltd, Bombay
SHRI P. L. NAG	Ministry of Defence (DGI)
SHRI H. L. SRIVASTAVA (*Alternate*)	
DR J. K. NIGAM	Shri Ram Institute for Industral Research, Delhi
SHRI K. K. JUNEJA (*Alternate*)	
DR S. Y. PANDIT	Bayer (India) Ltd, Bombay
DR P. V. RAIKAR (*Alternate*)	
SHRI B. ROY	East India Rubber Works Pvt Ltd, Calcutta
SHRI J. M. SHROFF	Bhor Industries Ltd, Bombay
SHRI S. K. VERMA	Caprihans India Ltd, Bombay
SHRI Z. S. KAJIJI (*Alternate*)	

(*Continued on page* 10)

Indian Standard

METHODS OF TEST FOR COATED AND TREATED FABRICS

PART 6 DETERMINATION OF BURSTING STRENGTH

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 6) (First Revision) was adopted by the Indian Standards Institution on 10 March 1984, after the draft finalized by the Treated Fabrics Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 This standard was first adopted in 1973 and is now being revised to align it with ISO 3303-1979 ' Rubber or plastic-coated fabrics — Determination of bursting strength ', published by the International Organization for Standardization (ISO).

0.3 Two methods of test (A and B) have been included in this standard. Values obtained using Method A are not necessarily comparable with those obtained when using Method B. Therefore, when specifying a coated fabric for which a bursting strength requirement applies, the purchaser and the supplier should agree mutually the method of test to be employed.

0.4 Method A is recommended for use with those types of coated fabrics for which hydraulic bursting methods are not considered appropriate owing to the excessive pressures involved or where the risk of mechanical damage to the material in use is more relevant (for example, heavy weight double texture natural rubber coated fabrics).

0.5 This standard contains clauses **6.1** and **6.2** which call for an agreement between the purchaser and the supplier.

0.6 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard (Part 6) prescribes two methods (A and B) for the determination of the bursting strength of coted and treated fabrics.

1.1.1 Method A uses a tensile testing machine with a ring clamp and steel ball whilst Method B uses a diaphragm bursting tester operated by hydraulic pressure.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 2244-1972† shall apply.

3. APPARATUS

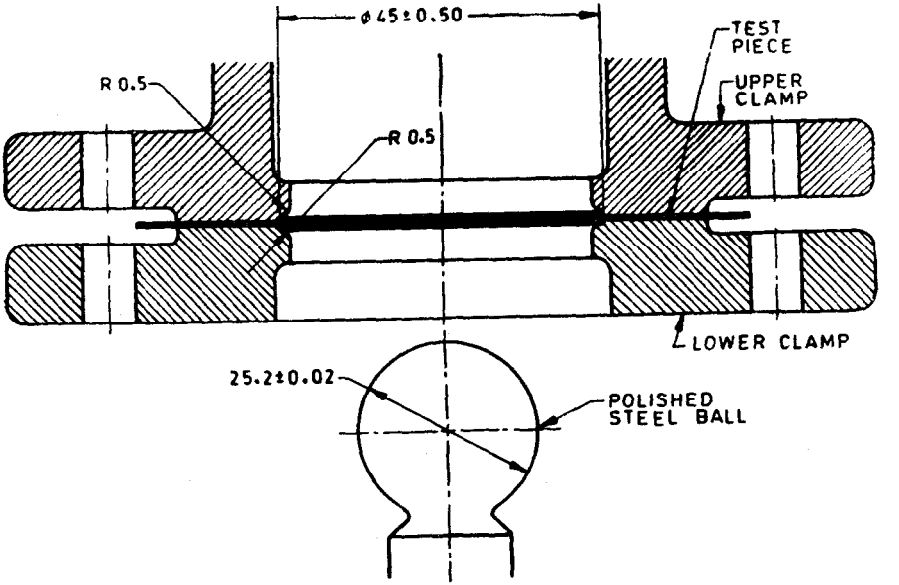
3.1 Method A (*see* Fig. 1)

3.1.1 *Principle* — A coated fabric is securely clamped between rigid coaxial apertures. A polished steel ball traversing at a fixed speed, is pressed against the coated fabric specimen until rupture occurs. The force required to cause the rupture is recorded.

3.1.2 *Tensile Testing Machine* — It shall be power driven and equipped with a suitable dynamometer. It shall be capable of maintaining a substantially constant rate of traverse of the moving head during the test and be fitted with an autographic recorder. An inertialess dynamometer (of electrical or optical type, for example) may be used. The accuracy of the machine shall be such that the error in the force measurement as shown and recorded does not exceed 2 percent of the force or 0·5 percent of the maximum of the scale, whichever is the greater.

NOTE — A pendulum-type inertia dynamometer may in fact give different results because of the effects of friction and inertia. When the use of an inertia dynamometer is unavoidable, information may be obtained in the following way. The capacity of the machine or the measuring scale selected, when a variable-range machine is involved, shall be such that the bursting force is between 15 percent and 85 percent of the rated capacity.

*Rules for rounding off numerical values (*revised*).
†Glossary of terms relating to treated fabrics (*first revision*).



All dimensions in millimetres.

FIG. 1 APPARATUS FOR METHOD A

3.1.2.1 The tensile testing machine shall be provided with a bursting attachment, such that the test piece is held securely by a ring mechanism of internal diameter 45 ± 0·50 mm, with the centre of the test piece pressed against a polished steel ball of diameter 25·2 ± 0·02 mm until the test piece ruptures. The direction of motion of the ring-clamp or steel ball shall be at right angles to the plane of the fabric.

3.1.2.2 The central points of the two jaws of the machine shall be concentric and shall be in the line of pull, the front edges being perpendicular to the line of pull, and their clamping faces in the same plane. The jaws shall be capable of holding the specimen without allowing it to slip, shall be so designed that they do not cut or otherwise weaken the specimen, and shall be wider than the test specimen. The faces of the jaws should preferably be smooth and flat but when the specimens cannot be satisfactorily held with flat-faced jaws even with packing, engraved or corrugated jaws may be used.

In case of engraved jaws, the clamping surfaces of the upper and lower clamps shall be grooved concentrically such that the crowns of the grooves of one plate fit the grooves of the other. The grooves shall be not less than 0·8 mm apart and not less than 0·15 mm deep. The grooves shall start no further than 3 mm from the edge of the aperture and

shall be rounded to a radius of not greater than 0·4 mm. The lower inner edge of the upper clamp and the upper inner edge of the lower clamp shall be rounded off to a radius of 0·5 mm.

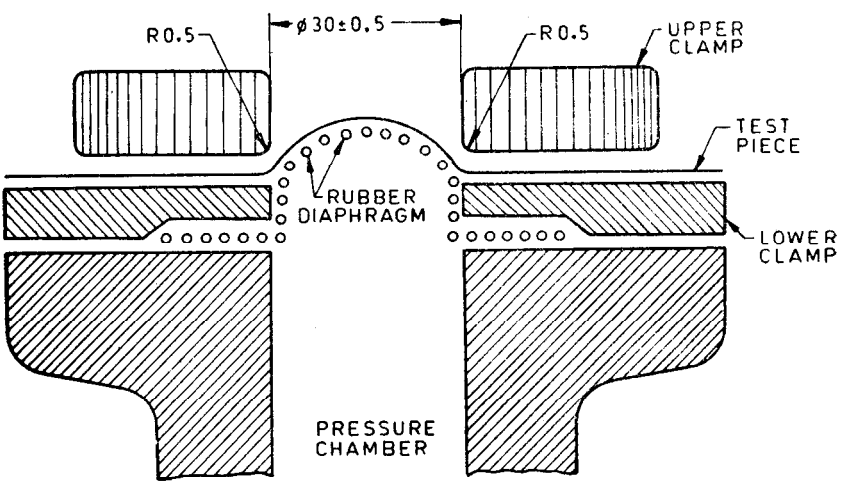
NOTE — Pieces of felt approximately 3 mm thick have been found to be suitable for packing, but the choice of type of jaws and packing should be that combination which gives the highest breaking load and does not cause an undue number of breaks in close proximity to the edges of the jaws. Suitable packing materials for use with either smooth or corrugated jaws include paper, felt, leather, plastics or rubber sheet.

3.2 Method B (*see* Fig. 2)

3.2.1 *Principle* — A coated fabric specimen is clamped between coaxial apertures. An elastic diaphragm is caused to exert pressure on the coated fabric specimen by the introduction of liquid below the diaphragm at a constant rate. The pressure required to cause the coated fabric specimen to burst is recorded.

3.2.2 *Testing Machine* — It shall be either mechanically or manually operated. It shall permit the clamping of the test piece between two circular clamps of diameter not less than 55 mm and having coaxial apertures of 30 ± 0·5 mm diameter.

3.2.2.1 The clamping surfaces of the upper and lower clamps shall be grooved concentrically such that the crowns of the grooves of one plate fit the grooves of the other. The grooves shall be not less than



All dimensions in millimetres.

FIG. 2 APPARATUS FOR METHOD B

0·8 mm apart and not less than 0·15 mm deep. The grooves shall start no further than 3 mm from the edge of the aperature and shall be rounded to a radius of not greater than 0·4 mm. The bottom inner edge of the upper clamp shall be rounded to a radius of 0·5 mm. The lower clamp shall be integral with the chamber in which liquid is introduced. The chamber shall be covered with a rubber diaphragm fitted to expand through the aperture and exerting pressure on the coated fabric between clamps.

3.2.3 *Pressure Gauge* — The apparatus shall be provided with a means for transmitting hydraulic pressure to the rubber diaphragm. A pressure gauge of the maximum reading type, of appropriate capacity and graduated in kgf/cm^2 or kilo-pascals shall be provided for registering the bursting pressure. It shall preferably be used within the range from 25 percent to 75 percent and in no case outside the range from 15 percent to 85 percent of the maximum capacity of the scale. It shall at any point within the working range be accurate to within 1 percent of the maximum capacity of the scale. The pressure gauge shall be calibrated at least once in a year to maintain the specified accuracy.

4. SAMPLING

4.1 The sample shall be so cut that it is as representative as possible of the whole consignment. The test pieces shall be cut at least 100 mm from the selvedge and at least 1 m from the extremity of the piece.

5. PREPARATION OF TEST PIECES

5.1 Cut across the full width of the sample, a rectangular strip not less than 100 mm wide so that its sides make an angle of $45° \pm 15°$ with the longitudinal direction. Take six test pieces, equally spaced across the width of the sample. The smallar dimension of each test piece shall be at least 12 mm greater than the outside diameter of the ring clamp mechanism of the test machine. Alternatively, the sample may be tested at the requisite location across its width.

6. CONDITIONING OF TEST PIECES

6.1 For all test purposes, the minimum time between manufacture and testing shall be 16 hours. For non-product tests, the maximum time between manufacture and testing shall be 4 weeks and for evaluations intended to be comparable, the tests, as far as possible should be carried out after the same time-interval. For products, whenever possible, the time between manufacture and testing should not exceed 4 months. In other cases, tests should be made within 2 months of the date of receipt by the customer.

6.2 Conditioning — Condition the test pieces at $27 \pm 2°C$ and 65 ± 5 percent relative humidity for 48 hours prior to testing. Subject to agreement between the purchaser and the supplier, the conditioning time may be curtailed to 24 hours.

6.3 When it is required to determine the properties of wet material, the test pieces shall be immersed for 24 hours in distilled water containing 1 percent ethanol at 27 ± 2°C. The test pieces shall be cut prior to the immersion. Immediately after removal from the water, the test pieces shall be blotted between two sheets of absorbent paper and tested at once.

7. PROCEDURE

7.1 Method A

7.1.1 Mount the conditioned test piece in the ring clamp. Move the test piece and steel ball towards each other at a rate of 300 ± 30 mm/min until the test piece ruptures under the pressure being applied by the steel ball. Read from the scale of the tensile testing machine the force in newtons to cause the rupture of the test piece.

NOTE — For single coated fabrics place the coated face of the test piece downwards and for double coated fabrics test three pieces with the face side upwards, and three with the face side downwards.

7.1.2 Calculate the bursting strength, in kilo-pascals, using the relation:

$$\text{Bursting strength} = \frac{F \times 10^6}{A}$$

where

F = the rupturing force, in kilo newtons; and

A = the internal cross-sectional area, in square millimetres of the ring-clamp.

Record the mean of the six results obtained.

7.2 Method B

7.2.1 Place the conditioned test piece over the rubber diaphragm of the apparatus (*see* Note under **7.1.1**). Secure the clamping ring tightly over the test pieces and increase the pressure on the rubber diaphragm by introducing liquid into the chamber until the test piece bursts. Allow between 7 and 20 seconds for the pressure to increase from zero to bursting point. Record the pressure required as shown by the maximum indicating point on the gauge and return the pointer to zero. For each test piece, record the bursting pressure and note the form of bursting obtained (namely cross or slit).

NOTE — Ignore any burst which occurs at or near the edge of the clamp and repeat the test on another test piece.

7.2.1.1 Calculate the mean of the six results obtained for bursting pressure and then apply the diaphragm correction factor as given in **7.2.2.**

7.2.2 *Correction Factor* — With the same rate of liquid flow as that employed in the test (*see* **7.2.1**), distend the diaphragm, without the presence of the specimen, but with the clamping ring in position, and note the pressure required to distend it by an amount equal to the average distension of the specimen at burst. This pressure is the 'diaphragm correction factor' and is the value by which the mean bursting pressure should be reduced.

7.2.3 Report the corrected mean bursting pressure as the bursting strength.

8. TEST REPORT

8.1 The test report shall state:

a) Reference of the sample;

b) Conditioning method and the time of exposure;

c) Conditions in which the test has been conducted;

d) Method of test employed (A and B) and aperture used;

e) Bursting strength, expressed in kilo-pascals; and

f) For Method B, the form of bursting obtained.

(*Continued from page* 2)

Panel for Physical Methods of Test for Treated Fabrics, PCDC 16 : 6 : 1

Convener	*Representing*
DR B. R. C. ANAND	ILAC Ltd, Calico Group, Bombay
Members	
SHRI BASANT KUMAR	Basant Pran Electric Co Pvt Ltd, Calcutta
SHRI J. S. NARULA (*Alternate*)	
SHRI A. T. BASAK	Directorate General of Supplies and Disposals, New Delhi
SHRI P. K. BASU (*Alternate*)	
SHRI T. S. BIDDAPA	National Organic Chemical Industries Ltd, Bombay
DR P. D. TRIVEDI (*Alternate*)	
SHRI B. DUTTA	Bengal Waterproof Ltd, Calcutta
SHRI A. GHOSH	National Test House, Calcutta
SHRI S. P. MANIK	Research, Designs and Standards Organization, Lucknow
SHRI B. ROY	Techno Polymer Laboratories, Calcutta

AMENDMENT NO. 1 OCTOBER 1997
TO
IS 7016 (PART 6) : 1984 METHODS OF TEST FOR COATED AND TREATED FABRICS

PART 6 DETERMINATION OF BURSTING STRENGTH

(First Revision)

(*Page* 8, *clause* 7.1.2, *last line*) — Substitute 'median' *for* 'mean'.

(PCD 13)

Reprography Unit, BIS, New Delhi, India